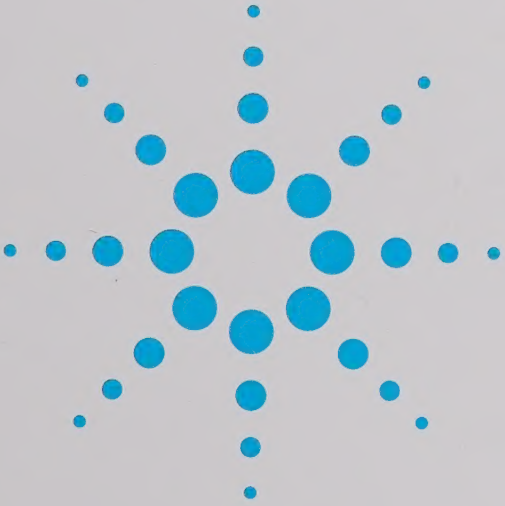
Agilent J2126-7A
Transmission Test Sets
Quick Reference Guide



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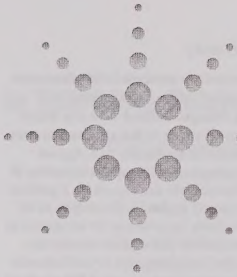

Agilent J2126/7A Transmission Test Sets

Quick Reference Guide

Agilent Technologies

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In This Quick Reference Guide...

This guide contains information on:

- The conventions used within this guide.
- A Getting Started chapter for new users.
- An introduction to using the Graphical User Interface (GUI), including information on the display windows, the menus and basic GUI operations.
- An introduction to using Online Help, including information on how to add and use your own help files.
- Using Smart Test and SignalWizard, the quick and easy way to set up and use the Transmission Test Set.
- A tutorial to help familiarize yourself with setting up measurements and logging the results. Separate SONET and SDH versions are included.
- Some tips on avoiding problems when making measurements.
- Quick reference tables listing the front panel settings to rapidly select major instrument functions.

Conventions Used in This Guide...

- Front panel buttons appear in bold within angled brackets. For example, press **<Menu>**.
- When buttons are connected by a plus (+) sign, for example, **<2>** + **<4>**, press the listed buttons in sequence.
- Menu items appear in bold. The greater than (>) symbol separates each menu level. For example, '**Test Functions** > **Errors and Alarms**' indicates that you should choose 'Errors and Alarms' from the 'Test Functions' main menu.
- Field items and drop down list entries appear in **bold**. For example, 'select **Signal Rate** field and choose **OC-3** from the drop-down list'.
- This Guide applies to both SONET and SDH network standards. Where there is a difference in the terminology used between these two standards, the SONET version is given first.

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Product Description

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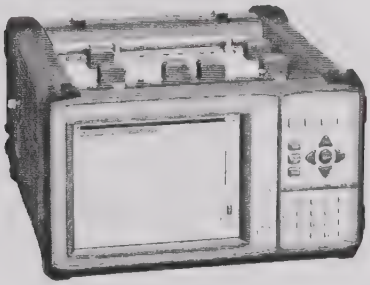
Introduction

The Agilent J2126/7A Transmission Test Sets provide all the test capability you need to install and verify the performance of today's high-capacity transmission systems and networks in one portable package.



- Global test coverage (SONET, SDH, PDH and T-Carrier).
- Full integrated all-rate testing:
  - 52 Mb/s to 10 Gb/s optical.
  - 52/155 Mb/s; DS1/3; 2/8/34/140 Mb/s electrical.
- Full range of standard and concatenated mappings
- All standard error and alarm measurements, plus:
  - optical power, electrical level, pulse mask, frequency
  - service disruption time, pointer movements, delay
- Simultaneous all-channel testing (up to 192 STSs/AUs).
- Thru-mode monitoring.
- Comprehensive SONET/SDH overhead testing
- Fast access to key measurement tasks using Smart Test
- Line frequency offset.
- Transmit and Receive can be independently configured
- Broad range of graphical results tools

- Comprehensive online help facilities:
  - Online User manual.
  - Context-sensitive help for each control field.
  - Ability to add your own help documents.

Option Guide

This guide explains the features offered with each Transmission Test Set mainframe and its associated options.

There are two mainframes:

- J2126A - for optical interfaces up to 2.5 Gb/s.
- J2127A - for optical interfaces up to 10 Gb/s.

Mainframe Test Rate Capability

Mainframe	Optical Test Interfaces
J2126A	OC-1, OC-3, OC-12, OC-48 STM-0, STM-1, STM-4, STM-16
J2127A	OC-1, OC-3, OC-12, OC-48, OC-192 STM-0, STM-1, STM-4, STM-16, STM 64

Optical Interfaces

	Wavelength	Option
Select one wavelength option for optical interfaces up to 2.5 Gb/s	1310 nm optical transmitter	100
	1550 nm optical transmitter	101
	1310/1550 nm optical transmitter	102
Optical Interfaces operating at 10 Gb/s	1550 nm optical transmitter	111

Optical Connectors

Connector	Option
FC/PC Adapters fitted on all optical interfaces	190
SC Adapters fitted on all optical interfaces	191
ST Adapters fitted on all optical interfaces	192

Other Options

Certificate of Calibration

Option UK6: Calibration certificate with test data

Warranty and Service Plans

Option W30: Warranty extended to 3 years.

Option W50: Warranty extended to 5 years.

Enhanced Testing Upgrade – J2129A

Firmware upgrade product that adds the following test facilities:

- Electrical interfaces (DS1/3; 2/8/34/140 Mb/s; 52/155 Mb/s)
- VT/TU payload testing
- DS1/3 and 2/34/140 Mb/s service mappings
- DSn and PDH (En) testing
- Pulse mask testing (up to 52 Mb/s electrical)
- Service disruption measurement
- Round trip delay measurement
- Electrical level measurement
- Graphical error and alarm result displays
- G.821, M.2100, M.2101, M.2101.1, M.2110, M.2120 performance analysis

Accessories

Additional Documentation

J7280A: Full set of printed manuals:
User's Guide
Quick Reference Guide
Remote Control Manual
Verification Manual

Carrying Cases

J7286A: Hard transit case (for J2126A).

J7287A: Hard transit case (for J2127A).

J7288A: Soft carrying case (for J2126/7A).

Optical Adapters and Cables

J7283A: FC/PC optical connector (exchangeable)

J7284A: SC optical connector (exchangeable)

J7285A: ST optical connector (exchangeable)

J7281A: DCC port converter cable: 9-pin miniature D type to 37-pin D-type (RS-449, female)

2 Getting Started

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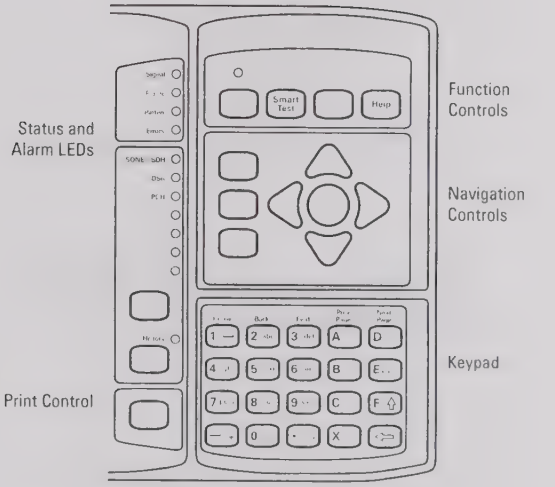
This chapter guides you round the many features of the instrument. It also includes information on how to chose the network standard (SONET or SDH) for the instrument.

Front Panel Tour



Function Controls

	Press this button to start a new test period or terminate the current test period. The LED indicator above the button is on when a test period is in progress
	Press this button to access the Agilent Smart Test menu

Press this button to add a single error to the transmitted signal. The type of error added is selected on the **Test Functions > Errors and Alarms** page.

Press this when you need to refer to the online help. Press it again to take you back to the instrument display.

Navigation Controls

The **<Arrow Navigation>** buttons move the focus up/down/left/right through menus, drop-down lists and the instrument display.

Press **<Select>** to enter any selected menu item or value you have entered into a field.

Press **<Menu>** to display the main menu for the current application.

Press **<Menu>** again, or press **<Cancel>**, to close the menu.

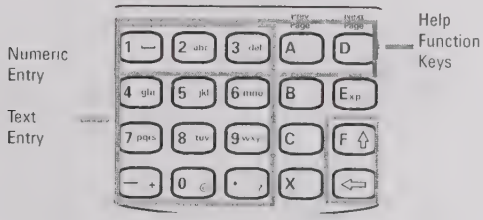
Press **<Window>** to change the focus between the left and right windows.

<Cancel> will close any menu or drop down list without making any changes.

Keypad

The keypad provides quick text and numeric entry. Some keys are also used for navigation in the online help system.

The operation of the keys depends on the mode of operation for the current entry field.



Numeric Entry

In a numeric entry field, enter the number you want using the keypad. Decimal, binary and hexadecimal entries are all made directly from the keypad.

Special keys used in numeric entries:

Press **<Minus>** to enter a negative value, for example for a frequency offset of -99.9 ppm, press
< - > + <9> + <9> + < . > + <9>

Press **< X >** for 'don't care' entries

Use this key to enter an exponent, for example for an error rate of 9.9E-9 press:
<9> + < . > + <9> + <Exp> + < - > + <9>

To edit a number press the **<Left Arrow>** key for backspace operation deleting preceding entry

Text Entry

In a text entry field, for example a trace message, the keypad will be in text mode. To enter text press the key labelled with the character you want: once for the first character, twice (pressing the key quickly in succession) for the second and so on. This is similar to the way you enter text on a cell phone.

The keys have the form "abc2ABC", "def3DEF" - so that pressing the key four times in quick succession would enter the number. You can enter numbers or upper case letters quickly using the **<F/up arrow>** key - this switches the mode between lower case characters (CapsOff), upper case (CapsOn) and number (Num). The current mode is displayed at the bottom right of the screen on the Status Line.

Special keys used in text entries:

This key switches between upper and lower case characters and numbers. The current mode, either "Caps" or "Num" - is displayed at the bottom right of the screen on the Status Line.

Press this key for these special characters:

space _ NUL LF CR

Press this key for these math symbols

- + / * = < > % ^

Press this key for these miscellaneous symbols

@ # 0 $ \ & ~ ( ) [ ] { }

Press this key for these punctuation symbols

. ? ! , : ; " ' '

Help Function Keys

These keys are used for additional navigation when in Online Help.

Returns you to the Home page.

Takes you back to the previous page.

If you have used the **<Back>** key for navigating then this key takes you forward to where you have come from. Otherwise, pressing this key has no effect.

Scrolls up through the displayed page.

Scrolls down through the displayed page

Print Control

Press **<Print Control>** to access the print control page

Status and Alarm LEDs

The Status LED indicators provide information about the status of the instrument's receiver. The Signal, Frame and Pattern indicators are green if the signal is good, and red during an alarm condition. Error indicator is off or red if error detected.

SIGNAL Green: Valid signal (level; data transitions) detected at input. Red: No data transitions detected at input or low optical/electrical power.

FRAME Green: Correct framing detected at all levels of the received signal (on the line signal plus all levels down to the selected test channel). Red: Frame alignment lost at one or more levels of the received signal.

PATTERN Green: Correct detection of expected test pattern. Red: Expected test pattern not received.

ERRORS Red: An error has been detected in the received signal. The indicator remains red for 100 ms, then returns to off.

SONET/SDH: Indicates that at least one SONET or SDH alarm is present.

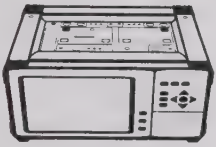
DSn: Indicates that at least one ANSI DS0, DS1, DS2 or DS3 alarm is present.

PDH: Indicates that at least one ETSI E0, E1, E2, E3 or E4 alarm is present.

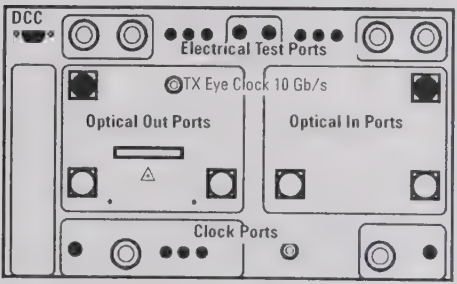
History: Press **<Show More>** to view the alarm history. **<Show More>** provides access to the detailed alarm information (both current status and history). If an alarm has occurred during the current test period, the History indicator will be on.

Press **<Reset>** to reset the Alarm History data. The History LED will go off. If an alarm condition is present during the reset, then the LEDs associated with that alarm will remain on after the reset. Resetting of the history data also occurs when you start a new test period.

Top Panel Tour



Top Panel Connectors



Optical Out Ports

Provides SONET optical signals OC-1, OC 3, OC 12, OC 48, OC-192, and SDH optical signals STM 0, STM 1, STM 4, STM-16, STM 64 at wavelength 1310 and 1550 nm, depending on instrument model and options

52 Mb/s - 2.5 Gb/s 1310 nm

Selectable optical connector (see "Optical Connectors" on page 12) for a 52 Mb/s to 2.5 Gb/s optical output. Nominal wavelength is 1310 nm. Power output is -5 to +0 dBm

52 Mb/s - 2.5 Gb/s 1550 nm

Selectable optical connector (see "Optical Connectors" on page 12) for a 52 Mb/s to 2.5 Gb/s optical output. Nominal wavelength is 1550 nm. Power output is -2 to +3 dBm.

10 Gb/s, 1550 nm

Selectable optical connector (see "Optical Connectors" on page 12) for a 10 Gb/s optical output. Nominal wavelength is 1550 nm. Power output is -1 to +1 dBm.

Optical In Ports

Accepts SONET OC-1, OC-3, OC-12, OC-48 and OC-192 and SDH STM-0, STM-1, STM-4, STM-16, STM-64 signals, depending on the model and options fitted.

52 - 622 Mb/s

Selectable optical connector (see "Optical Connectors" on page 12) for a 52 Mb/s to 622 Mb/s optical input (OC-1, OC-3, OC-12/STM-0, STM-1, STM 4 signals). Wavelength 1200 to 1600 nm. Input damage power >+3 dBm; never exceed maximum input power. The recommended input power operating level for OC-1, OC-3/STM-0, STM-1 signals is -33 to -10 dBm and for OC-12/STM-4 signals -28 to -8 dBm.

2.5 Gb/s

Selectable optical connector (see "Optical Connectors" on page 12) for a 2.5 Gb/s optical input (OC-48/STM 16 signals). Wavelength 1200 to 1600 nm. Input damage power> +3 dBm; never exceed maximum input power. The recommended input power operating level for OC-48/STM-16 signals is -28 to -8 dBm.

10 Gb/s

Selectable optical connector (see "Optical Connectors" on page 12) for a 10 Gb/s optical input (OC-192/STM 64 signals). Wavelength 1200 to 1600 nm. Input damage power >+1 dBm; never exceed maximum input power. The recommended input power operating level for OC-192/STM-64 signals is -20 to -9 dBm.

Clock Ports

2 Mb/s, 2 MHz Clock In

BNC 75 ohm (nominal) unbalanced connector for a 2 Mb/s and 2 MHz MTS external clock source input.

2 Mb/s, 2 MHz Clock In

3-pin Siemens connector for a 2 Mb/s and 2 MHz MTS external clock source input.

DS1 Clock In

Bantam 100 ohm (nominal) connector for a DS1 BITS external reference clock input.

2 MHz Clock Out

BNC 75 ohm (nominal) unbalanced connector for a 2 MHz MTS clock reference output. Generated relative to the selected transmit reference clock.

DS1 Clock Out

Bantam 100 ohm (nominal) connector for a DS1 BITS clock reference output. Generated relative to the selected transmit reference clock.

TX Eye Clock 52 - 2.5 Mb/s

SMA connector providing a TX Eye Clock signal (at 1/4 of the line rate) which can be used to trigger an oscilloscope when examining data signals.

TX Eye Clock 10 Gb/s

SMA connector providing a TX Eye Clock signal (at 1/16 of the line rate) which can be used to trigger an oscilloscope when examining data signals.

DCC Port

Connector: 9-pin miniature D-type.

Use this port to insert and drop either the D1 D3 DCC channel or the D4 D12 DCC channel. The first bit of data inserted will be put into the MSB of the DCC channel. The MSB of the dropped data bytes will be output first. The transmit (drop) and receive (insert) capabilities are independent, that is, the transmit and receive clock rates can be set to different rates. Note that the instrument acts as a DCE (Data Communications Equipment), that is, it will supply the clock signal for both drop and insert operation.

Pin Number	RS-449/422 Circuit
1	Rx Data Output (+)
2	Rx Clock Output (+)
3	Signal ground
4	Tx Clock Output (+)
5	Tx Data Input (+)
6	Rx Data Output (–)
7	Rx Clock Output (–)
8	Tx Clock Output (–)
9	Tx Data Input (+)

Rate:	D1-D3 DCC: 192 kb/s D4-D12 DCC: 576 kb/s.
Signal Type:	Unipolar differential signal as defined in ANSI EIA-422-B and EIA-423-B.
Input Termination:	100 ohms differential.
Input Sensitivity:	500 mV over a ±15 V common mode range and 200 mV over a ±7 V range.

Electrical Test Ports

J2129A enhanced testing product is required for these ports to be active.

SONET/SDH Out

BNC 75 ohm unbalanced connector for an STS-1/STM-0 (B3ZS) or STS-3/STM-1 (CMI) electrical output.

SONET SDH In

BNC 75 ohm unbalanced connector for an STS-1/STM-0 (B3ZS) or STS-3/STM-1 (CMI) electrical input. Input Mode - Terminate or Monitor. Monitor mode conforms to G.772-1993. Monitor Gain - 20 or 26 dB.

2 Mb/s Out

3-pin Siemens 120 ohm balanced connector for an E1 Transmit or E1 Drop signal output. Either this port or the 2-140 Mb/s DS3 unbalanced Out port can be active for the E1 Transmit function.

2 Mb/s In

3-pin Siemens 120 ohm balanced connector for an E1 Receive or E1 Insert signal input. Either this port or the 2-140 Mb/s DS3 unbalanced In port can be active for the E1 Receive function.

DS1 Out

Bantam 100 ohm balanced connector for a DS1 Transmit or DS1 Drop output.

DS1 In

Bantam 100 ohm balanced connector for a DS1 Receive or DS1 Insert input.

2-140 Mb/s DS3 Out

BNC 75 ohm unbalanced connector for E1, E2, E3, E4, DS3 transmit or E1, E3, E4, DS3 Drop output signals. Either this port or the 2 Mb/s balanced Out port can be active for E1 Transmit function.

2-140 Mb/s DS3 In

BNC 75 ohm unbalanced connector for E1, E2, E3, E4, DS3 receive or E1, E3 and E4 DS3 Insert input signals. Either this port or the 2 Mb/s balanced In port can be active for E1.

Left Side Panel Tour

GPIB

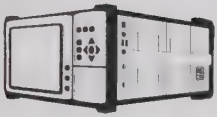
Allows test set to be remotely controlled via the GPIB control bus.

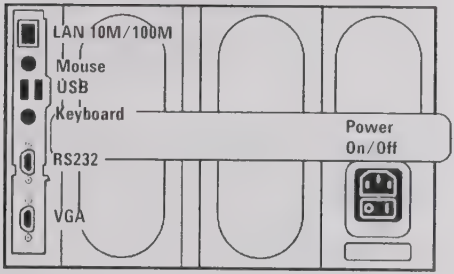
External Protective Earth

Floppy Disk Drive

Accepts 1.44 MB IBM formatted disks.

Right Side Panel Tour





LAN 10M/100M

10/100 Base-T LAN interface port. Supports remote control of test set and the downloading of firmware upgrades.

10 Base-T LAN Connection Radiated Emissions: To ensure compliance with EN 55011 (1991) a category 5, STP patch lead, RJ45 cable should be used to connect to the LAN port.

Mouse

PS/2 port for connecting a mouse. Activation of this port is planned as a future enhancement. (no timing details available at time of printing).

USB

Two Universal Serial Bus ports for connecting to a Printer and Modem. J2129A enhanced testing product required.

Keyboard

PS/2 port for connecting an external keyboard. Can be hot plugged for use at any time. Ensure that keyboard port is used - if connected to mouse PS/2 port in error the instrument will require to be restarted.

RS232

Remote Control port providing following configurations:

Controller Type:	Computer and Terminal.
Protocol:	None and Xon/Xoff.
Speed:	110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 baud.
Parity:	Odd, Even, 1s, 0s.
Stop Bits:	1, 2
Data Length:	7 bits.

VGA

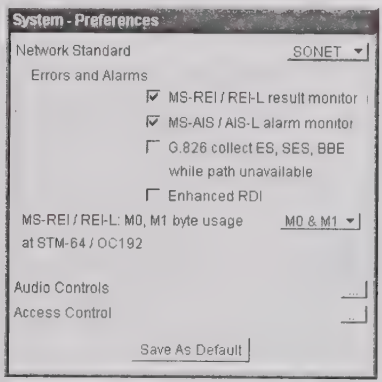
Connector for displaying contents of instrument screen on an external display. Ensure that the external display is connected before powering up the instrument.

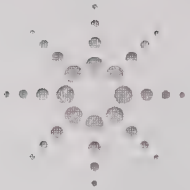
How to Select SONET or SDH Operation

The Transmission Test Set is a dual standard SONET/SDH instrument. Select the standard you require as follows:

1 Press the **<Menu>** key and select **System > Preferences**.

2 Press **<Select>** to open the Preferences window. Select SONET or SDH as required.





3 Using the Graphical User Interface

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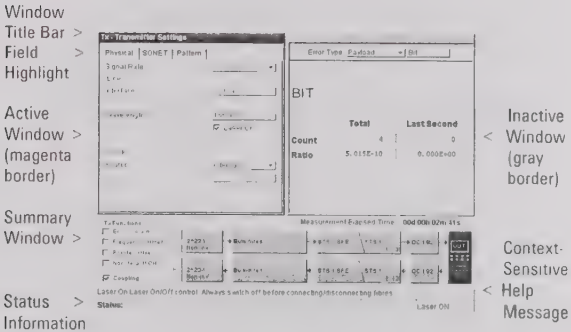
Menus 34
Basic User Interface Operations 35

The graphical user interface (GUI) with windows, menus and dialogs provides easy access to all the instrument setup, monitoring and results pages together with constant display of context-sensitive help and instrument status. The interface also allows you to use the built-in help system which gives detailed information on using the Transmission Test Set.

Display Windows

Instrument Windows



Two main instrument windows display the pages for setting up, monitoring and viewing results.

Only one of these windows is active at a time. The active window is indicated by a colored (magenta) border. Change the active window by pressing the **<Window>** button next to the arrow navigation buttons. Move around within a window by using the arrow navigation buttons. The current position on the window is shown by a red highlight box around the control field. The title of the current displayed page is given at the top of the window in the title bar. This also gives the menu name that the page has come from, for example Overhead Setup - Trace Messages is the Trace Messages page selected from Overhead Setup on the menu.

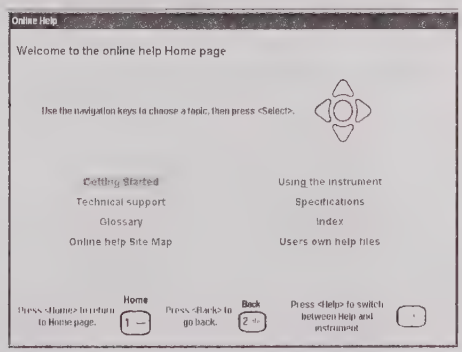
The Summary Window displays the current setup of the Transmitter and Receiver, along with Test Function Indicators and the Elapsed Time for the current measurement period.

A single line of Context-sensitive help appears at the bottom of the display. This gives you helpful information relating to the area of the screen that is highlighted by the red box.

The Status line displays the instrument and keyboard status.

Online Help Window

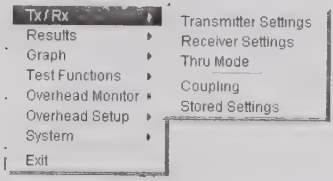
The instrument has a comprehensive built in help system. This is accessed at any time by pressing <Help>. To close the help just press <Help> again. The online help is displayed in a full size window.



The **<Help>** button toggles the display between the online help and the instrument windows – when you go back into online help it will be in the same page as when you left it.

Menus

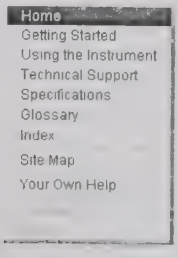
All instrument pages are accessed through the instrument's menu system by selecting an item from the menu. To display the main menu press **<Menu>**.



The focus will be on the first menu item and the submenu will also be displayed. As you move the focus down the menu, the submenu will automatically be displayed.

To select an item from the menu use the up/down arrow navigation buttons to move the focus through the main menu and the left/right arrow navigation buttons to move in and out of the submenus. To select a menu item press **<Select>**.

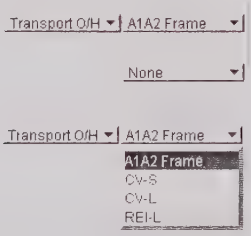
A menu is also available in the online help system to allow you to quickly navigate through the help system and provides quick access to the index and glossary To display, press **<Menu>**, while in online help.



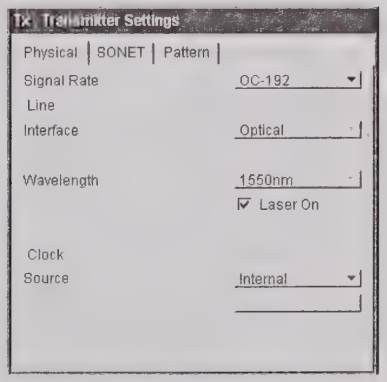
Basic User Interface Operations

To use a

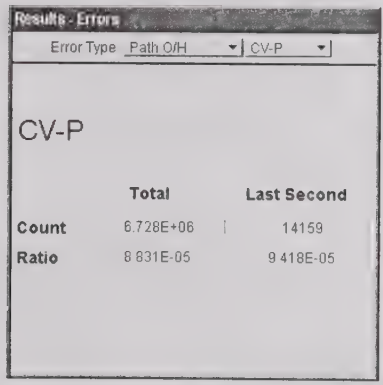
- **Drop-down list box** – move the highlight onto the control field and press **<Select>**. Use the arrow navigation buttons to highlight your choice, then press **<Select>**. To close the drop-down list without making a selection press **<Cancel>**



- **Folder selector** – some windows have multiple pages within a window which are separated by the use of folders. To select a folder move the highlight onto it.

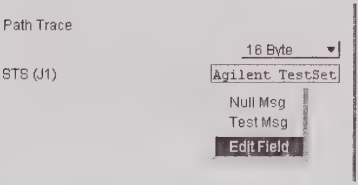


Drop-down lists have been used where there are multiple choices required. For example, in the Errors window you would first select the Error Path, followed by the **Error Type**.

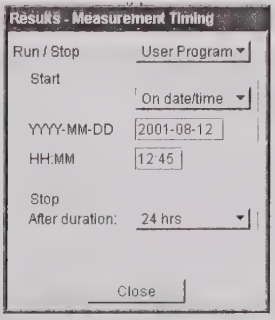


- **Numeric entry box** – move the highlight onto the control field. For quick numeric entry, use the keypad to enter the value. Pressing **<Select>** displays a drop-down list which gives presets or min/max settings, Edit Field and a list of the most recently used values for that field. The Edit Field allows you to select individual units for editing. This may be useful when editing one digit of an eight-digit binary number.

- **Text entry box** – move the highlight onto the control field. For quick text entry use the keypad which will be in text mode. (See "Keypad" on page 18 for details on how to use the keypad to enter text). Pressing **<Select>** displays a list of presets, an edit mode and a list of the most recently used text.



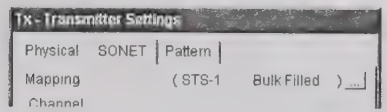
- **Modal window** – a modal window is used when some action is required on certain settings. For example when setting up Measurement Timing - the Measurement Timing modal window will be displayed for you to setup the timing. You must then select **Close** to close the window. The **<Cancel>** button can also be used to quickly close the window - please note that this does NOT cancel any changes or settings you have made.

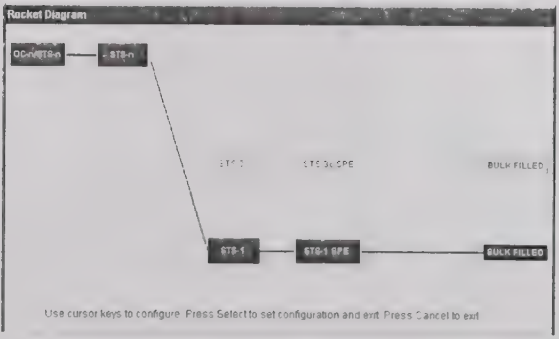


- **Display Action Buttons** – Buttons are generally used to process an action. For example, in Pointer Adjustment, to action a pointer burst you would move the highlight to the **Action Pointer Burst** button and press **<Select>**.

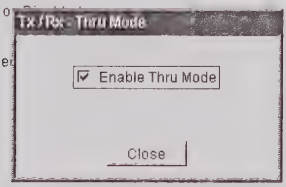
- A **More** button, indicated by three dots, is used on the interface to indicate that there is more information on selections available. To use this move the highlight to the button and press **<Select>**.

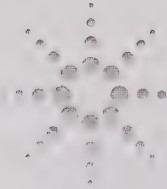
For example in **Transmitter Settings > Mapping** selecting the **More** button opens the Rocket Diagram.




Rocket Diagram
STS-1
STS-1 SPE
BULK FILLED
Use cursor keys to configure. Press Select to set configuration and exit. Press Cancel to exit

- **Checkboxes** -- these are used to set a control either OFF or ON. For example, to enable Thru Mode move the highlight to the checkbox and press **<Select>**.





4 Using Online Help

Which Keys Do I Press? 42
Context-Sensitive Help 43
Using the Index and Glossary 43
Adding and Using Your Own Help Files 43

The Online Help provides you with full information on how to set up and use the Transmission Test Set. A comprehensive index and glossary are included.

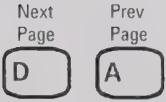
One of the main features of the Transmission Test Set is the ability to add your own help files. This chapter tells you how to do this.

Which Keys Do I Press?

Press this when you need to refer to the online help. Press it again to take you back to the instrument settings.

Returns you to the Home page.

The **<Back>** and **<Fwd>** keys are used the same way as in a typical Web browser - Use the **<Back>** key to go back to the previous page and, if you have just used the **<Back>** key for navigating then the **<Fwd>** key takes you forward to where you have come from.



These key are used in the same way as Page Up and Page Down on your PC. When there is more information on a page than can be viewed at any one time, use the **<Prev Page>** and **<Next Page>** keys to scroll the display.

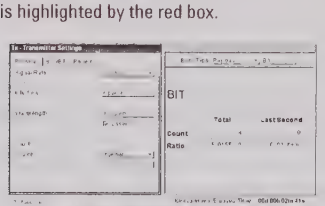
Pressing **<Menu>** displays a drop-down list of the main contents of the online help. Use the Arrow keys to highlight what you want to view, then press **<Select>**.

Most of the pages of online help have several links to more information. The link that is currently active is highlighted To follow the link, just press the **<Select>** key.

If the link you want to follow is not highlighted, use the **<Arrow Navigation>** buttons to highlight what you want to view, then press **<Select>**

Context-Sensitive Help

A single line of text appears at the bottom of the display. This gives you helpful advice relating to the area of the screen that is highlighted by the red box.



< Context-Sensitive Help Message

Using the Index and Glossary

To find information quickly on a particular topic press **<Menu>** and select **Index** or **Glossary** when in Help mode.

Adding and Using Your Own Help Files

One of the benefits of this Transmission Test Set is that you can add your own help files to the instrument and access them through the Online Help system. This may be a useful tool if you wish to store specific instructions for your technicians to carry out routine procedures, help them with problem solving, or detail test procedures that they should follow.

Access Your Own Help Files

To access your own help files that you have installed on the instrument, press **<Help>** + **<Home>** on the instrument panel, and select **Users Own Help files**. Then select:

ownhelp.html

The names of your own help files will then be displayed as a list of links. To access a particular file, move the focus on to the link and press **<Select>**.

Create Your Own Help Files

The help files you create to install on the instrument must be in HTML format. You can create them using an HTML editor tool, or with a word processor that will save them as HTML files. When creating your files for online use follow these simple guidelines:

- Use only a sans serif type font of size 12, 14 or 16 point, Normal or Bold - DO NOT use italic as this font is not supported on the instrument and can cause problems with the presentation of your document.
- Any images you include should be either GIF or JPEG.
- Write several short documents rather than one long one. A long document takes longer to open.
- Design a page size and layout that's appropriate for the size of the instrument display.
- Have all the documents and images in one folder/directory. The instrument does not currently support file tree structures.
- Total size of the files should not be more than 1.44Mb.

The instrument supports HTML Standard 3.2 - presentation or operation of elements using later HTML standards are not guaranteed to operate or display on the instrument.

The following procedure was used to create the example help files that are installed in the instrument - you can view the results on the online help in the 'Users Own Help Files' section.

The example help files can be copied from the instrument and amended for your own use. See "Copy Your Own Help Files to Disk" on page 47.

1 A standard word processor was used to create the content. Keeping your document short, two pages or so, will make it quicker to load and navigate when on the instrument

2 Save the document as HTML with the file extension html NOT htm.

3 You can open your HTML file in a Web browser to check your converted file.

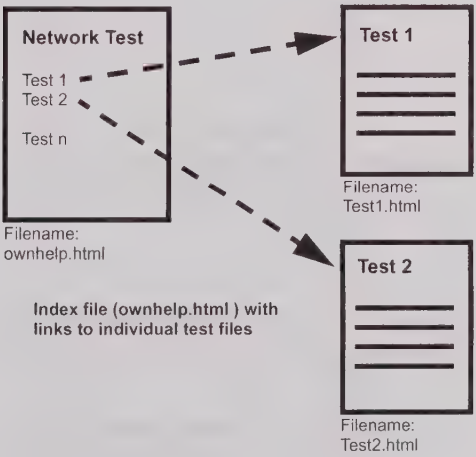
TIP: When saving your files, give them a meaningful name as it is this filename that will appear as a link in the index file online. For example 'AtlantaBasinTest5.html'.

4 When you have finished creating your HTML files you must now create an index file with links to each of your HTML files.

5 To do this, open a new file and create a hypertext link from this file to each of your help files.

6 Save the document as HTML. You must name this index file ownhelp.html. It is important that you use this name as it is used to access your files within the instrument.

7 Copy all of your HTML files, along with any image files that have been created, onto a floppy disk which you now need to install on the instrument.

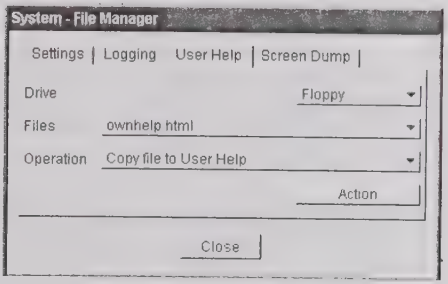


Install/Update Your Own Help Files

The files are added to the Transmission Test Set by downloading them from a floppy disk.

1 Insert the floppy disk into the disk drive on the left side of the instrument.

2 Press **<Menu>** and select **System > File Manager.**



3 Select the **User Help** folder as shown above.

4 Set the **Drive** field to **Floppy**.

5 Select the **Operation** field and choose **Refresh List**. Move the focus to the **Action** field and press <Select> to refresh the list of files.

6 Select the Operation field and choose **Copy all files to User Help**.

7 Move the focus to the **Action** button and press **<Select>**.

Your files will now be uploaded from the floppy disk to the instrument.

Your files must all have the extension html, with images as jpg or gif. Remember, your main index file must be named 'ownhelp.html' and be loaded into the instrument in order for the links to operate.

To update files you have already installed in the instrument, repeat the steps 1 to 7, but for step 7 Select the **Operation** field and choose **Copy file to User Help** - you can then select the update file you want to install.

When adding files to the instrument any files with the same name will be overwritten and new files will be added.

8 To check that you can access the files, press **<Help>** + **<Home>** on the instrument panel, and select **Users Own Help Files**. Select **ownhelp.html** and your filenames should all appear as links.

Copy Your Own Help Files to Disk

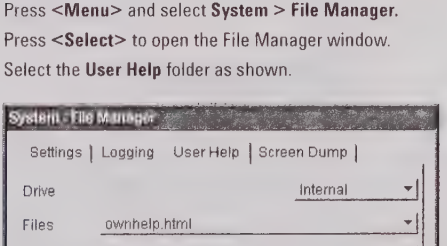
To copy files from the instrument to a floppy disk:

1 Insert a floppy disk into the disk drive on the left side of the instrument.

2 Press **<Menu>** and select **System > File Manager.**

3 Press **<Select>** to open the File Manager window.

4 Select the **User Help** folder as shown.



5 Set the **Drive** field to **Internal**.

6 Select the **Operation** field, press **<Select>** and choose **Refresh List**. Move the focus to the **Action** field and press **<Select>** to refresh the list of files.

7 Select the **Files** field and choose a file.

8 Select the **Operation** field and choose **Copy file to floppy** or **Copy all files to floppy** as required.

9 Move the focus to the **Action** button and press **<Select>**.

Your files will now be downloaded from the instrument to the floppy disk.

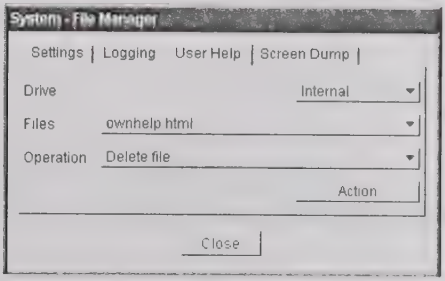
Delete Your Own Help Files

You can use File Manager to delete User Help files stored internally or on a floppy disk.

1 Press **<Menu>** and select **System > File Manager.**

2 Press **<Select>** to open the File Manager window.

3 Select the **User Help** folder as shown.



4 Set the **Drive** field to **Internal** or **Floppy** as required

5 Select the **Operation** field, press **<Select>** and choose **Refresh List**. Move the focus to the **Action** field and press **<Select>** to refresh the list of files.

6 Select the **Files** field and choose the file you wish to delete.

7 Select the **Operation** field and choose **Delete file** or **Delete all files** as required.

8 To delete the file/files select the **Action** field and press **<Select>**.

5
Using Smart Test and SignalWizard

SignalWizard 50
Shortcuts 62
Reset Instrument 62
To Exit SignalWizard 62

Press **<Smart Test>** to quickly access the most commonly used instrument features such as:

- SignalWizard
- Shortcuts
- Reset Instrument

SignalWizard

You can use SignalWizard to perform simultaneous monitoring of all STS/AU paths on any SONET/SDH signal from 52 Mb/s to 10 Gb/s. Once enabled, SignalWizard automatically:

- Detects all test ports currently receiving active signals and allows selection of the port to be tested if more than one is active.
- Discovers the line rate and channel structure of any valid signal. This includes different types of network paths and the mix of standard and concatenated channels within the signal.
- Simultaneously monitors the line signal and all STS/AU channels (up to 192) for errors and alarms in the received signal and VT/TU channels (J2129A enhanced testing product required) in a selected STS/AU.
- Shows which channels are unequipped and the type of service being carried by equipped channels.
- Provides listing and search tools for path trace messages.

More SignalWizard Information For more application information on SignalWizard, please refer to the appropriate Product Notes on the CD-ROM supplied with your instrument.

Receiver Input Signal Detection

SignalWizard scans the Transmission Test Set input signal ports for a valid input signal.

For SONET/SDH optical signals, SignalWizard determines the incoming connection port, line rate and interface level

Operation of electrical ports is enabled with the J2129A enhanced testing product installed. In this case the termination, signal level and line coding are determined.

Payload Detection

When channelized signals are detected at the STS/AU level, the J1 trace message for each channel is captured. You can use the navigation arrows to select a channel of interest and view the trace message.

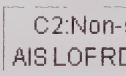
SignalWizard also monitors pointers, errors and alarms in all of the detected STS/AU channels, and if they contain VT/TU sub-channels these also can be examined.

J2129A enhanced testing product is required to examine VT/TU structures.

Errors

For each STS/AU channel B3 and REI-P/HP-REI errors are monitored. Two flags, one momentary and one latched, are set if one or more errors are discovered in any 100 ms interval.

Alarms



For each channel a flag is set for each of the alarms if it is present during the 100 ms interval.

- Loss of Pointer (LOP)
- Path AIS (AIS-P/AU-AIS)
- Remote Path Alarm (RDI-P/HP-RDI)
- Pointer Adjustment LOP (LOP flashes blue on each adjustment)

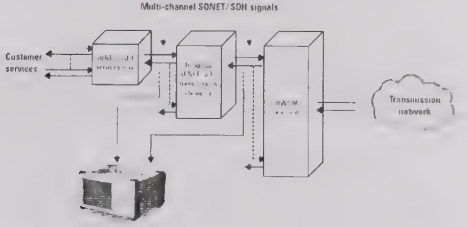
Monitor Path Trace Messages

During installation and commissioning of new services, or troubleshooting, the ability to generate and monitor path trace messages is essential. This allows you to confirm correct routing paths through network equipment with software controlled routing capability. You can also use path trace messages for checking routing performance of network elements during protection switching to confirm the correct signals have been protected in fault conditions.

Use SignalWizard to quickly confirm correct routing performance of network elements, and identify and locate any routing errors within the network.

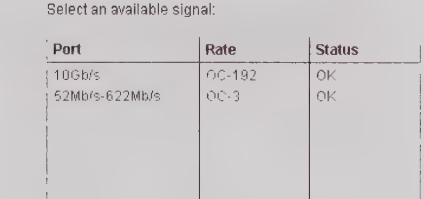
In-Service Monitoring

If you are troubleshooting transmission problems, commissioning new SONET/SDH transmission systems or performing routine maintenance checks, use SignalWizard to simultaneously monitor all channels within the received signal.

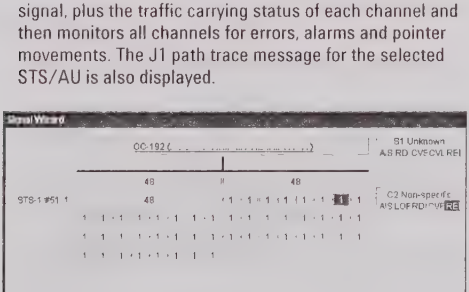


Typical In-Service Test Connections

1. Connect a SONET/SDH signal to the appropriate **Optical In** port on the Transmission Test Set (that is, the port that matches the expected line rate of the source signal).
2. Press the instrument front panel **<Smart Test>** button.
3. Select **SignalWizard** from the Smart Test menu and press **<Select>**. SignalWizard will start and a window will be displayed indicating the application progress. When complete it indicates 100%. If it fails to complete (for example, if there are no signals present) SignalWizard displays a page that allows you to rescan ports (for example, after checking connections) or to return to the main instrument.
4. If there is more than one valid signal at the Transmission Test Set receive ports they are displayed as shown in the following example. A signal is valid if its power level and frequency rate lie within the parameters of the input port to which it is connected. If only one signal is detected at the input ports, or if the instrument is in Thru-Mode, SignalWizard skips the port selection display and moves directly to the channel Overview page.



5 Press **<Select>**, then using the front panel navigation arrows, select the port receiving the signal you wish to examine and press **<Select>**. SignalWizard automatically identifies and displays the line rate, J0 trace messages, section/line errors and alarms and channel structure of your signal, plus the traffic carrying status of each channel and then monitors all channels for errors, alarms and pointer movements. The J1 path trace message for the selected STS/AU is also displayed.



Overview Page

6 Refer to "Overview Window Explained" on page 60 for a detailed explanation of how to interpret the contents of the SignalWizard graphical display.

Results

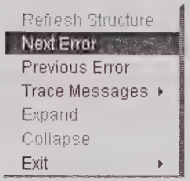
7 Results for all channels (up to 192) are summarized (using color coding) on the overview graphical display. Use the navigation arrows to select individual channels and examine the detailed status results for that channel.

Color Coding		Result
Green		No errors/alarms detected during test
Red		Errors/alarms detected during last 100 ms period
Yellow		Last 100 ms period error/ alarm free but errors/ alarms detected earlier in test period
Blue		Pointer movement in last 100 ms period
Red/Black stripes		Current AIS (STS-3c/AU-4)
Red/Black		Current AIS (STS-1/AU-3)
Grey		Unequipped
Black		Illegal

Next Error/Previous Error Monitor

If there are a number of errors displayed you can use the Next Error/Previous Error navigation function to quickly select/ view errored channels.

8 With the SignalWizard Overview window still displayed, press **<Menu>** and choose from the drop down menu



Viewing J1 Path Trace Messages:

9 Using the navigation arrows select the STS/AU channel of interest and view its J1 path trace message (shown at bottom of graphic display). Using this method select other channels as required. To view all the J1 path trace messages present in the input signal see "To View all the J1 Path Trace Messages in the Receive Signal:" on page 55.

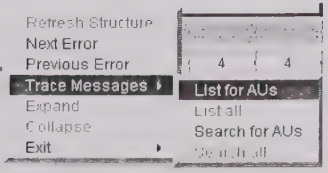
Path Trace Overview and Search

This allows you to discover and identify routing errors within the network.

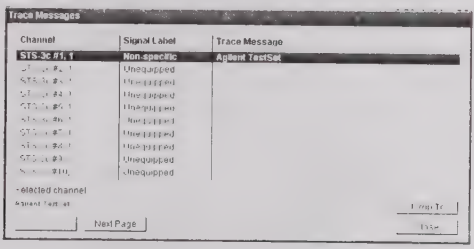
- View all the J1 path trace messages for the received signal at the same time.
- View all the J2 path trace messages associated with VT/TU channels in a selected STS/AU (J2129A enhanced testing product required).

To View all the J1 Path Trace Messages in the Receive Signal:

10 Press **<Menu>** and from the drop down menu choose the type of search required.



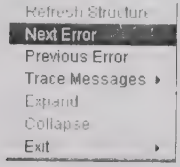
11 Press **<Select>** to open the Path Trace Overview window. An example of a Trace Message overview display of J1 messages in STS channels is as follows:



To View the J2 Path Trace Messages in a VT/TU Channel:

J2129A enhanced testing product required.

12 STS/AU channels that contain VT/TU channels are shown underlined on the display. Select the one of interest and press **<Select>** to open a new window giving further analysis. An alternative method of the displaying the VT/TU structure is to select the channel and then select **<Menu> > Expand** as shown.



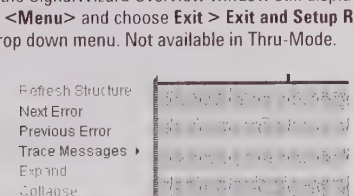
13 To close the VT/TU substructure display press **<Cancel>** or select **Collapse** from the menu shown above.

Setting the Receiver to a Selected Channel

Once you have run SignalWizard and the structure/content of the input signal have been identified it is useful to be able to set up the instrument receiver to match the settings of the input signal. This would enable you to perform further tests on the signal under test without having to reconfigure the receiver.

Performing this function terminates SignalWizard.

1 With the SignalWizard Overview window still displayed press **<Menu>** and choose **Exit > Exit and Setup Rx** from the drop down menu. Not available in Thru-Mode.



2 Press **<Select>** to action the configuration copy.

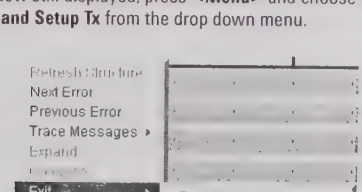
The receiver settings of signal rate/interface and foreground mapping are now set to those of the input signal. If you were monitoring a particular channel in SignalWizard, then the receiver mapping is configured for this channel.

If you exit SignalWizard without choosing **Setup Rx** or **Setup Tx**, the Transmission Test Set settings prior to running SignalWizard are retained.

To Copy Input Signal Settings to Transmitter:

You can set up the Transmission Test Set transmitter settings of Signal Rate/Interface and mapping to match those of the input signal identified during SignalWizard. Not available in Thru-Mode.

1 Once you have run SignalWizard and with the Overview window still displayed, press **<Menu>** and choose **Exit > Exit and Setup Tx** from the drop down menu.



2 Press **<Select>** to action the configuration copy.

To Copy Input Signal Settings to Transmitter and Receiver:

You can copy the input signal configuration settings to the instrument transmitter and receiver. Not available in Thru-Mode.

1 Once you have run SignalWizard and with the Overview window still displayed, press **<Menu>** and choose **Exit > Exit and Setup Rx and Tx** from the drop down menu.

2 Press **<Select>** to action the configuration copy.

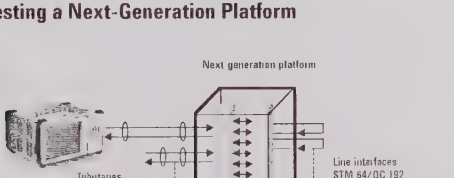
Out-of-Service Testing

You can use the Transmission Test Set transmitter along with SignalWizard monitoring capability to test each STS 1/AU 3 path carried within a SONET/SDH tributary or line signal

SignalWizard also identifies:

- The type of network paths present in the signal output by the network element, including the mix of STS/AU channel types.
- The traffic carrying status of each STS/AU channel, showing which are equipped.

Testing a Next-Generation Platform



Tributary-Side Testing Setup

You can apply the test signal to the tributary side or the line side of the network element. Applying a test signal to the line side ca possibly reduce the number of ports that need to be checked (see "Line-Side Testing Setup" on page 60).

1 Connect the SONET/SDH input signal (from the element under test) to the appropriate **Optical In** port on the Transmission Test Set.

2 Connect the appropriate Transmission Test Set transmitter **Optical Out** port to the required receiver input port on the system under test.

3 Press **<Menu>** and choose **Tx/Rx > Transmitter Settings**.

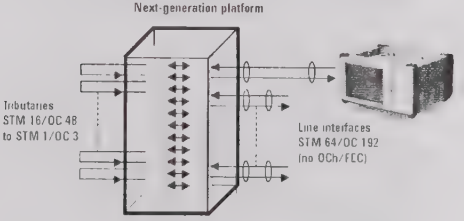
4 Select the Transmitter **Physical** window and choose the required Signal Rate, Line and Clock settings (remember to switch on the laser).

5 Select the Transmitter **SONET/SDH** window and choose the required **Mapping**, **Channel** and **Background Settings**.

6 Select the Transmitter **Pattern** window and choose a **Pattern**.

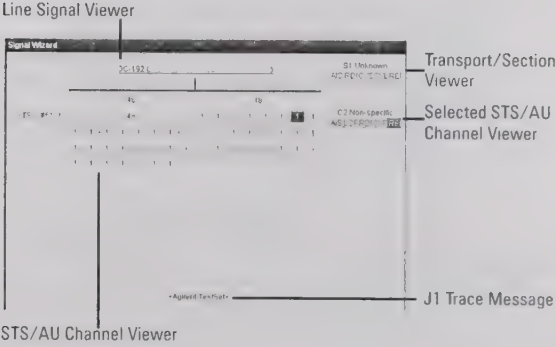
7 Press the front panel **<Smart Test>** key; choose **Signal-Wizard** and press **<Select>** If there is more than one signal available, the port selection table appears. Select a port and within 3 seconds the Signal Overview window will be displayed giving a graphical display of the line rate, structure, content and error/alarm status of the received signal.

8 Use the navigation arrows to choose channels of interest.



Line-Side Testing Setup

Overview Window Explained



Line Signal Viewer

Displays the detected SONET/SDH signal (OC-192/48/12/3/1 or STM-64/16/4/1/0). If a J0 trace message is detected this is also displayed (both 16- and 64- byte message formats are supported).

Transport/Section Viewer

Displays results information associated with the transport/section level of the signal, including:

- Synchronization status message (decoded S1 byte)
- CV-S (B1), CV-L (B2) and REI-L/MS-REI error status
- AIS-L/MS-AIS and RDI-L/MS-RDI alarm status

(LOS and LOF alarms are displayed on the instrument's front panel LEDs.)

Selected STS/AU Channel Viewer

Displays result information associated with the selected STS channel, including:

- Type of payload (traffic) being carried in the channel (decoded C2 byte)
- CV-P (B3) and REI-P/HP-REI error status
- AIS-P/AU-AIS, LOP P/AU-LOP and RDI-P/HP-RDI alarm status
- Indicator for detected pointer adjustments

J1 Trace Message

Displays the decode path trace message associated with the selected channel. Both 16- and 64-byte messages formats are supported.

STS/AU Channel Viewer

Each STS/AU channel detected in the signal is provided with a dedicated box that summarizes the channel status. An STS/AU channel carrying VT/TU channels is highlighted by its size designator being underlined. Broadband mappings are not underlined.

The size designator displayed within each box is the channel size identifier. While any non-standard concatenated channels will be detected and displayed, no errors or alarms are reported for that channel. Unequipped channels are displayed on a grey background.

Pointer activity within a channel is indicated by the STS/AU channel background flashing blue.

Size Designators

SONET		SDH	
1	STS-1 channel	3	AU-3 channel
3c	STS-3c channel	4	AU-4 channel
12c	STS-12c channel	4c	AU-4-4c channel
48c	STS-48c channel	16c	AU-4-16c channel
192c	STS-192c channel	64c	AU-4-64c channel

Shortcuts

Use this function to quickly select one of the following:

- Stored Settings
- Optical Power
- Frequency Measurement
- Trouble Scan
- SONET/SDH Overhead Monitor
- SONET/SDH Received Pointer Graph

Reset Instrument

Select this function if you wish to set the instrument to its factory default settings.

To Exit SignalWizard

Press **<Smart Test>** then **<Select>**

6 Measurement Tutorial - SONET

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This Chapter takes you through the steps you should follow to set up a typical bit error rate (BER) measurement.

Measuring Bit Error Rate

The bit error rate (BER) test is one of the simplest and most effective ways to measure the quality of a SONET transmission link. You can use the Transmission Test Set to make a BER test on a two-way link that is connected in loop-back configuration.

Measurement Setup

The following procedure shows how to use the Transmission Test Set controls and arrow navigation buttons to set up and perform a measurement.

In this procedure you will configure the instrument to transmit and receive an OC-12 optical signal with an STS-3c SPE payload containing a 2^23-1 PRBS test pattern. Measurement test timing is set to be started and stopped manually, and errors and alarms are inserted into the transmitted signal to confirm that the Transmission Test Set receiver measures and displays those conditions. In this procedure the Transmission Test Set transmitter output is connected directly to the receiver input. Under normal operating conditions the Transmission Test Set transmitter output would be connected to a system under test and the output from the system connected to the Transmission Test Set receiver input.

For information on good practises used when connecting to optical interfaces please refer to "Avoiding Optical Receiver Overload" on page 89 and "Avoiding Problems When Making Measurements" on page 88.

1. Check the Test Set **Optical Out** ports (top panel) and ensure that all **Laser On** LEDs are Off. There should also be a **Laser-OFF** message on the instrument **Status** line (bottom of display).
2. Before making any connections to the receiver **Optical In** ports always check the input power level on a Power Meter
3. On the Transmission Test Set connect the **52-2.5 Gb/s Optical Out port** (1310 or 1550 nm depending on options fitted to your instrument) to the receiver **52-622 Mb/s Optical In port** through a 15 dB attenuator.

Set Up Transmitter

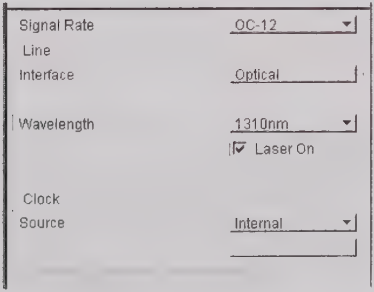
Set up the Transmission Test Set transmitter as follows:

4 Press **<Menu>** and select **Tx/Rx > Transmitter Settings**, then press **<Select>**.

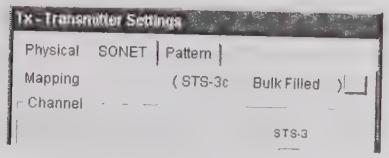
5 Select the **Physical** field.

6 Select the **Signal Rate** field and press **<Select>** to reveal a drop down menu of the available signal rates. Use the navigation arrows to highlight OC-12, then press **<Select>** to set the signal rate.

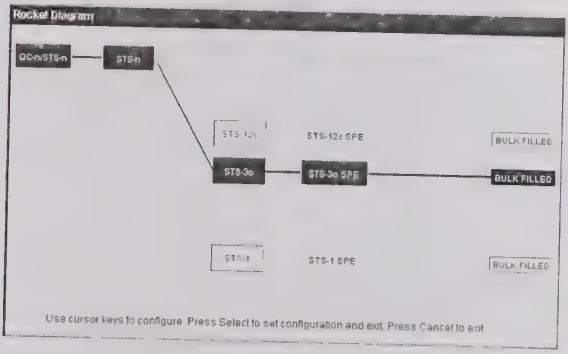
Use the navigation arrows to set up the other Transmitter fields, **Line** (includes Wavelength and Laser On/Off selection, set Laser to **On**), and **Clock** Source as shown below. For safety, only turn laser on after the fibre has been connected to the transmitter. Check the Status line for any warnings of optical power overload.



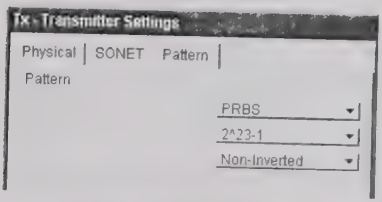
7 Move the cursor focus to the top of the Transmitter Settings window and select **SONET**.



8 Move the cursor to the **Mapping** field and press **<Select>**. Use the navigation arrows to select the required mapping from the Rocket Diagram then press **<Select>**.



9 Move the cursor focus to the top of the Transmitter Settings window and select **Pattern**. Set up **Payload Pattern** as shown below.

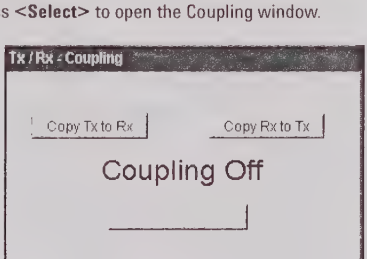


Couple Tx and Rx

To ensure the receiver has the same setting as the transmitter:

10 Press **<Menu>** and select **Tx/Rx > Coupling**.

11 Press **<Select>** to open the Coupling window.



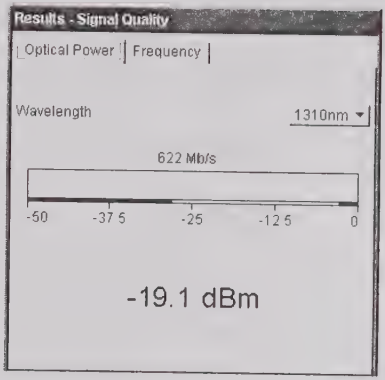
12 If Coupling is **ON** proceed to step 16. If it is **OFF** (indicated as shown above), proceed to step 13.

13 Select **Copy Tx to Rx** (this selection copies Transmitter settings into the Receiver) and press **<Select>**. Move the cursor to **Close** then press **<Select>** to exit the Coupling window.

Check Receiver Input Power

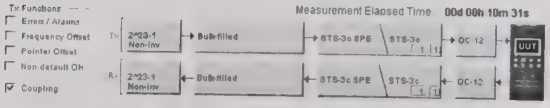
14 Check the **Status** line at the bottom of the display for any warning messages and check Receiver Input Power as follows.

15 Press **<Menu>** and select **Results > Signal Quality** and check the Receiver Input Power. An example is given on the next page.



Check Setup

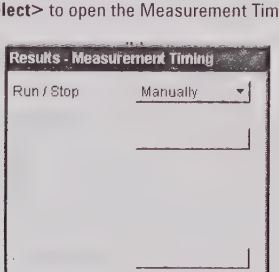
The Transmitter and Receiver settings should now be identical. You can check this by viewing the Transmission Test Set Summary window at the bottom of the display.



Set Measurement Gating

16 Press **<Menu>** and select **Results > Measurement Timing**.

17 Press **<Select>** to open the Measurement Timing window.



18 Set the measurement **Start gating** and **Stop gating** to **Manually**. Setting both to manually ensures that testing is controlled via the green **<Run/Stop>** button on the instrument front panel.

19 Use the navigation arrows to select **Close**, then press **<Select>** to close the window.

Start Measurement

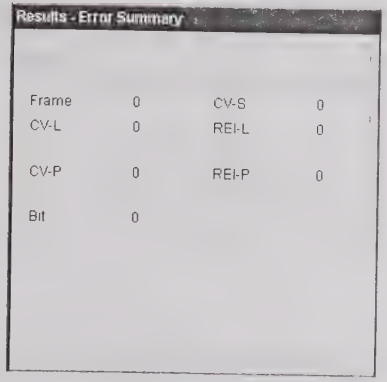
20 Press the front panel **<Run/Stop>** button to start the measurement.

21 The measurement will continue until you end the measurement gating period by pressing **<Run/Stop>**. Leave the Transmission Test Set continuously gating.

View Results

22 To view results press **<Menu>** and select **Results > Error Summary**.

23 Press **<Select>** to open the Error Summary window.



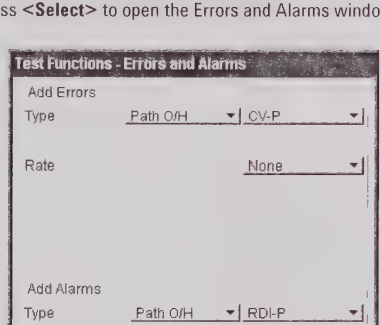
24 Check that there are no errors displayed.

25 To confirm that the Transmission Test Set is measuring correctly, add errors and alarms to the output signal as follows:

Add Single Errors and an RDI-P Alarm to Tx Output

26 Press **<Menu>** and select **Test Functions > Errors and Alarms**.

27 Press **<Select>** to open the Errors and Alarms window.



28 Use the navigation arrows to set up errors and alarms as shown.

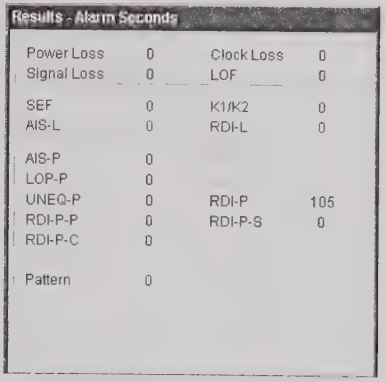
Add a Single Error

29 Press the front panel **<Single Error>** button (grey in color) a number of times. Check that with each button press the CV-P error count in the **Error Summary** results page increments. Try selecting other Error Types and Error Rates and observe the change to the results displayed.

View Alarm Results

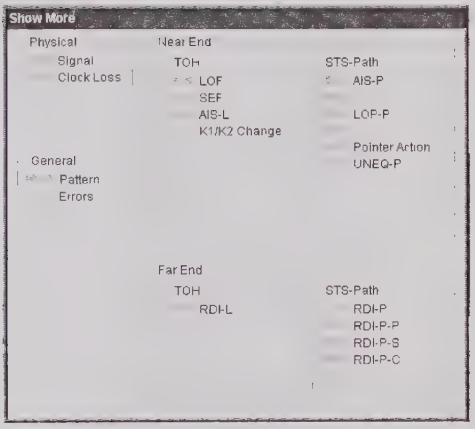
30 Press **<Menu>** and select **Results > Alarm Seconds**.

31 Press **<Select>** to open the **Alarm Seconds** window.



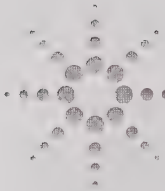
32 Check that the RDI-P alarm seconds count is incrementing, and that the front panel SONET/SDH LED alarm indicator is on (RDI-P alarm enabled in step 28).

33 Press the front panel **<Show More>** button (blue color) to see details of current and historical errors/alarms. Current errors/alarms are shown red, historical ones are shown yellow. See next page for an example of the **Show More** display.



34 Press the front panel **<Run/Stop>** button to stop the measurement.

End of Tutorial.



7 Measurement Tutorial - SDH

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This Chapter takes you through the steps you should follow to set up a typical bit error rate (BER) measurement.

Measuring Bit Error Rate

The bit error rate (BER) test is one of the simplest and most effective ways to measure the quality of an SDH transmission link. You can use the Transmission Test Set to make a BER test on a two-way link that is connected in loop-back configuration.

Measurement Setup

The following procedure shows how to use the Transmission Test Set controls and arrow navigation buttons to set up and perform a measurement.

In this procedure you will configure the instrument to transmit and receive an STM-4 optical signal with an AU-4-4c payload containing a 2^23-1 PRBS test pattern. Measurement test timing is set to be started and stopped manually, and errors and alarms are inserted into the transmitted signal to confirm that the Transmission Test Set receiver measures and displays those conditions. In this procedure the Transmission Test Set transmitter output is connected directly to the receiver input. Under normal operating conditions the Transmission Test Set transmitter output would be connected to a system under test and the output from the system connected to the Transmission Test Set receiver input.

For information on good practises used when connecting to optical interfaces please refer to "Avoiding Optical Receiver Overload" on page 89 and "Avoiding Problems When Making Measurements" on page 88.

1 Check the Test Set **Optical Out** ports (top panel) and ensure that all **Laser On** LEDs are Off. There should also be a **Laser-OFF** message on the instrument **Status** line (bottom of display).

2 Before making any connections to the receiver **Optical In** ports always check the input power level on a Power Meter.

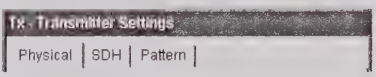
3 On the Transmission Test Set connect the **52-2.5 Gb/s Optical Out port** (1310 or 1550 nm depending on options fitted to your instrument) to the receiver **52-622 Mb/s Optical In port** through a 15 dB attenuator.

Set Up Transmitter

Set up the Transmission Test Set transmitter as follows:

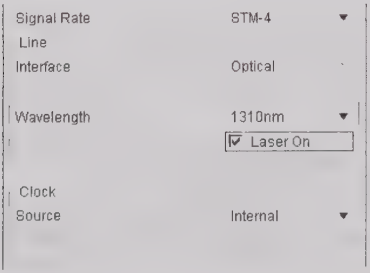
4 Press **<Menu>** and select **Tx/Rx > Transmitter Settings**, then press **<Select>**.

5 Select the **Physical** field.

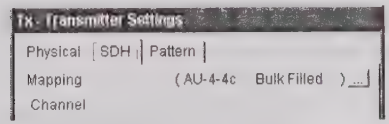


6 Select the **Signal Rate** field and press **<Select>** to reveal a drop down menu of the available signal rates. Use the navigation arrows to highlight STM-4, then press **<Select>** to set the signal rate.

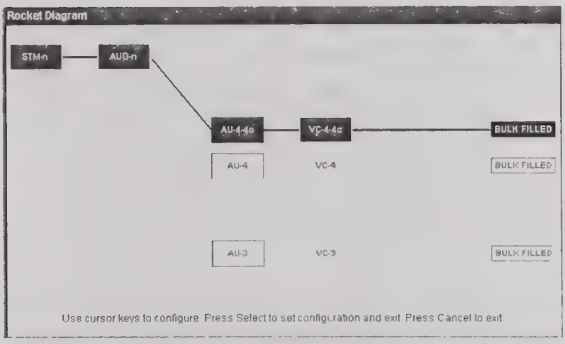
Use the navigation arrows to set up the other Transmitter fields, **Line** (includes Wavelength and Laser On/Off selection, set Laser to **On**), and **Clock** Source as shown below. For safety, only turn laser on after the fibre has been connected to the transmitter. Check the Status line for any warnings of optical power overload.



7 Move the cursor focus to the top of the Transmitter Settings window and select **SDH**.

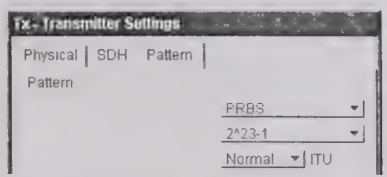


8 Move the cursor to the **Mapping** field and press **<Select>**. Use the navigation arrows to select the required mapping from the Rocket Diagram then press **<Select>**.



9 Ignore the Tandem Connection Monitoring field selection for this measurement.

10 Move the cursor focus to the top of the Transmitter Settings window and select **Pattern**. Set up **Payload Pattern** as shown below.

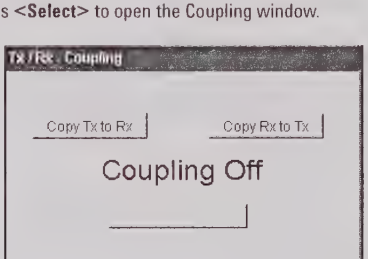


Couple Tx and Rx

To ensure the receiver has the same setting as the transmitter:

11 Press **<Menu>** and select **Tx/Rx > Coupling**.

12 Press **<Select>** to open the Coupling window.



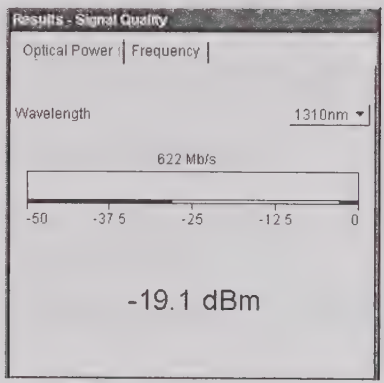
13 If Coupling is **ON** proceed to step 17. If it is **OFF** (indicated as shown above), proceed to step 14.

14 Select **Copy Tx to Rx** (this selection copies Transmitter settings into the Receiver) and press **<Select>**. Move the cursor to **Close** then press **<Select>** to exit the Coupling window.

Check Receiver Input Power

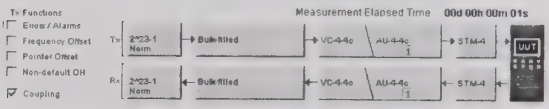
15 Check the **Status** line at the bottom of the display for any warning messages and check Receiver Input Power as follows.

16 Press **<Menu>** and select **Results > Signal Quality** and check the Receiver Input Power. An example is given on the next page.



Check Setup

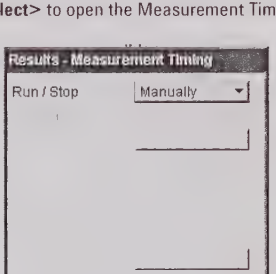
The Transmitter and Receiver settings should now be identical. You can check this by viewing the Transmission Test Set Summary window at the bottom of the display.



Set Measurement Gating

17 Press **<Menu>** and select **Results > Measurement Timing**.

18 Press **<Select>** to open the Measurement Timing window.



19 Set the measurement **Start gating** and **Stop gating** to **Manually**. Setting both to manually ensures that testing is controlled via the green **<Run/Stop>** button on the instrument front panel.

20 Use the navigation arrows to select **Close**, then press **<Select>** to close the window.

Start Measurement

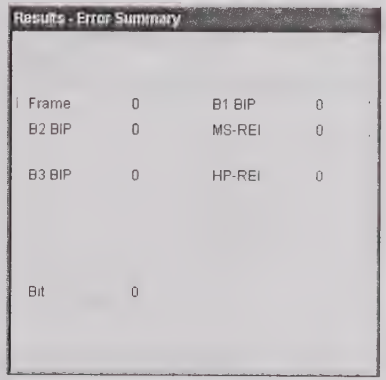
21 Press the front panel **<Run/Stop>** button to start the measurement.

22 The measurement will continue until you end the measurement gating period by pressing **<Run/Stop>**. Leave the Transmission Test Set continuously gating.

View Results

23 To view results press **<Menu>** and select **Results > Error Summary**.

24 Press **<Select>** to open the Error Summary window.



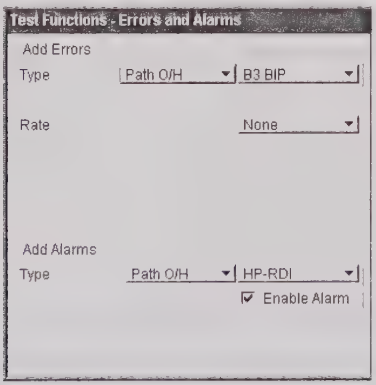
25 Check that there are no errors displayed.

26 To confirm that the Transmission Test Set is measuring correctly, add errors and alarms to the output signal as follows:

Add Single Errors and an HP-RDI Alarm to Tx Output

27 Press **<Menu>** and select **Test Functions > Errors and Alarm Generation**.

28 Press **<Select>** to open the Errors and Alarms window.



29 Use the navigation arrows to set up errors and alarms as shown.

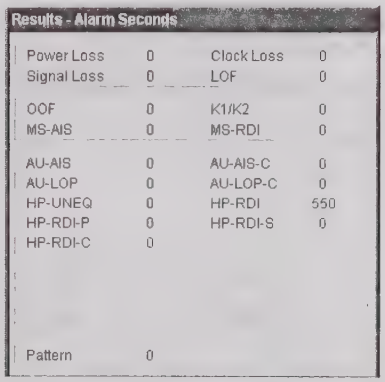
Add a Single Error

30 Press the front panel **<Single Error>** button (grey in color) a number of times. Check that with each button press the B3 error count in the **Error Summary** results page increments. Try selecting other Error Types and Error Rates and observe the change to the results displayed.

View Alarm Results

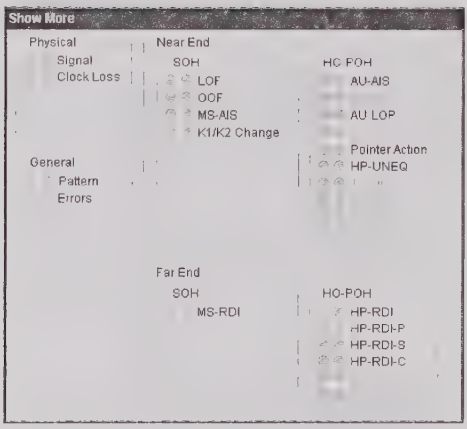
31 Press **<Menu>** and select **Results > Alarm Seconds**.

32 Press **<Select>** to open the **Alarm Seconds** window.



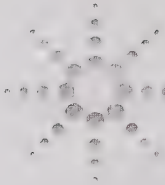
33 Check that the HP RDI alarm seconds count is incrementing, and that the front panel SONET/SDH LED alarm indicator is on (HP-RDI alarm enabled in step 29).

34 Press the front panel **<Show More>** button (blue color) to see details of current and historical errors/alarms. Current errors/alarms are shown red, historical ones are shown yellow. See next page for an example of the **Show More** display.



35 Press the front panel **<Run/Stop>** button to stop the measurement.

End of Tutorial.



8 Hints and Tips

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Cleaning Optical Connectors 90
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Avoiding Problems When Making Measurements

Bit errors that occur when the instrument is testing network equipment may be caused by a number of defects in the network. This can include faulty network elements, damaged optical fibre, particles of dust or dirt in the fibre connections, and so on.

However, often errors will be caused by other problems that are not the fault of the network. When testing, make sure that errors are not injected by the test environment. The following steps provide general advice on how to avoid introducing errors when performing tests.

- Ensure that optical fibres connecting the instrument to the network are not damaged - check that fibres have not been crimped.
- Avoid acute bends in the fibre. Ensure that fibres only have gentle arcs, to avoid causing errors.
- If the instrument is left unattended for a long term test, ensure that the equipment is not in a position where people will disturb the connecting fibres and cause bit errors.
- Ensure that all fibre connections are clean and dirt free. Cleanliness can be verified on a (unpowered) fibre with a fibrescope, and when connected to the network, with a power meter to ensure poor connections are not causing a drop in power. The Transmission Test Set internal power meter can be used to verify this.
- Before connection is made, always clean the connector ferrule tip with acetone or alcohol and a cotton swab. Dry the connector with compressed air. Failure to maintain cleanliness of connectors is liable to cause excessive insertion loss. See "Cleaning Optical Connectors" on page 90.

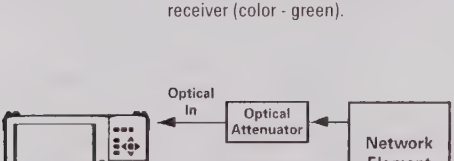
Avoiding Optical Receiver Overload

Check when connecting an optical transmitter to an optical receiver that you do not overload the receiver. This applies to elements under test and also the Transmission Test Set receiver input ports.

On the Transmission Test Set connector panel the following output/input power level information is printed:

Tx Optical Out ports: Maximum available output power (color - black).

Rx Optical In ports: Maximum input power (damage level) the receiver input can accept before damage occurs (color - yellow).
Recommended input power operating range for signals applied to the receiver (color - green).



When performing tests, it is recommended that you drive the optical receiver with a signal that has an average power in the middle of the receiver's operating range (mid-way between the upper and lower levels printed next to the Optical In port).

Cleaning Optical Connectors

We recommend cleaning the optical connectors at regular intervals using the following materials:

Description	Agilent Part Number
Compressed Air Can or Blow Brush	
Isopropyl Alcohol	8500-5344
Lens Cleaning Paper	9300-0761
Swabs	5080-5400

Do not insert any tool or object into the optical IN or OUT ports of the instrument as damage to or contamination of the optical fibre may result.

1 Disconnect the instrument from the Power Line or switch off the laser transmitter before commencing this cleaning procedure.

2 Remove the adapters from the optical IN and OUT ports by flipping back the lever on the optical adapter.

3 Using the blow brush with the brush removed blow through the ferrule of the standard flexible connector and the adapter.

4 If the optical fibre of the fixed connector requires further cleaning this entails disassembly of the module. This should be carried out only by suitably trained service personnel.

5 Apply some isopropyl alcohol to a piece of the cleaning paper and clean the barrel of the adapter. Using a new piece of cleaning paper, clean the face of the adapter. Repeat this operation, using a new piece of cleaning paper each time.

6 Use a blow bruxh or compressed air to remove any particles of cleaning paper which may be present.

7 Replace the adapters in the optical connector. Secure in place by clicking the retaining lever back into position.

Front Panel Soft Recovery (Cold Start)

An instrument "cold start" routine is provided to reset the instrument in the event of an unplanned hardware or firmware event. A cold start reboots the instrument and restarts the instrument from a default configuration file, erasing existing configuration information. Performing a cold start will therefore cause the current menu settings to be lost and will cause the instrument to power up in its default state.

Performing a Cold Start

1. Switch the instrument off and wait a few seconds.
2. Switch the instrument on and as the instrument boots up, look carefully at the display.
3. Wait for the "Initialising instrument" . . . . . text to be displayed. After a few seconds start to repeatedly press the **<Menu>** key until the Agilent splash screen appears with an options menu in the top left corner of the display.

   The following options are available:

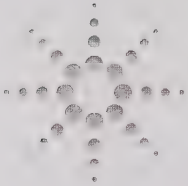
   1 Reload configuration.

   3 Cold start.

   5 Normal start.

   6 Upgrade software.
4. Press 3 on the numeric keypad to select cold start.
5. The unit will then continue with the boot up process.
6. When the boot-up procedure is complete, the instrument displays a dialog box with the message

   "Instrument reset to default settings."



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Only the main selections are listed here. It is assumed that the user understands that once a field is selected that the front panel <**Select**> button is then pressed to make the selection or to open the window.

Introduction

Use the front panel **<Smart Test>** and **<Print Control>** buttons for fast selection of SignalWizard, Measurements and Print Control functions. Use the **<Menu>** key to access all other functions.

Smart Test

You can use the front panel **<Smart Test>** button to quickly select one of the following:

Function – Using Smart Test	Path
SignalWizard	<Smart Test>, SignalWizard
Stored Settings, Optical Power, Frequency Measurement, Trouble Scan, Overhead Monitor or Pointer Graph	<Smart Test>, Shortcuts > choose as required
Reset Instrument to default settings.	<Smart Test>, Reset Instrument

Print Control

Function – Print Control	Path
Copy a snapshot of the logging results to a Printer/File	<Menu>, System > Measurement Logging
Copy a screen dump of current window to a file or Printer	<Print Control>, Destination - Printer or File

Transmitter Functions

Function – Transmitter Interface	Path
Setting the Transmit Interface	<Menu>, Tx/Rx > Transmitter Settings
Setting Tx Signal Rate, Interface, Code, Operating Level	<Menu>, Tx/Rx > Transmitter Settings, Physical
Setting Tx Mapping	<Menu>, Tx/Rx > Transmitter Settings, SDH/SONET
Setting Tx test pattern	<Menu>, Tx/Rx > Transmitter Settings, Pattern
Setting TCM in the Transmitter (SDH only)	<Menu>, Tx/Rx > Transmitter Settings > SDH
Setting Thru Mode	<Menu>, Tx/Rx > Thru Mode
Coupling Transmit and Receive Settings	<Menu>, Tx/Rx > Coupling
Recall or Save instrument configuration	<Menu>, Tx/Rx > Stored Settings

Receiver Functions

Function – Receiver Interface	Path
Setting the Receiver Interface	<Menu>, Tx/Rx > Receiver Settings
Setting Rx Signal Rate, Interface, Code, Operating Level	<Menu>, Tx/Rx > Receiver Settings, Physical
Setting Rx Mapping	<Menu>, Tx/Rx > Receiver Settings, SDH/SONET
Setting Tandem Connection Monitoring (SDH)	<Menu>, Tx/Rx > Receiver Settings > SDH
Setting Rx test pattern	<Menu>, Tx/Rx > Receiver Settings > Pattern
Using Smart Test shortcuts	<Smart Test>, Shortcuts > select as required
Using SignalWizard	<Smart Test>, SignalWizard
Coupling Receive and Transmit Settings	<Menu>, Tx/Rx > Coupling

Test Functions

Function – Test Functions	Path
Adding Errors and Alarms to the transmit signal	<Menu>, Test Functions > Error and Alarm Generation
Adding Frequency Offset to the transmitted line signal	<Menu>, Test Functions > Frequency Offset
Adding Pointer Adjustments	<Menu>, Test Functions > Pointer Adjustments
Inserting Data Communications Channel	<Menu>, Test Functions > DCC Drop/Insert
Dropping Data Communications Channel	<Menu>, Test Functions > DCC Drop/Insert
Perform instrument Self Test	<Menu>, Test Functions > Self Test
Switch off Test Functions	<Menu>, Test Functions > Switch Off

Overhead Setup

Function – Selecting Transmitter Overhead	Path
Setting Transmit Overhead Setup	<Menu>, Overhead Setup
Setting Tx Overhead Trace Messages	<Menu>, Overhead Setup > Trace Messages
Setting Tx Overhead Labels (Signal Labels, Sync Status)	<Menu>, Overhead Setup > Labels
Setting Tx Overhead APS Messages	<Menu>, Overhead Setup > APS Messages
Setting Tx Overhead Bytes	<Menu>, Overhead Setup > Byte Setup
Restore Byte Default values	<Menu>, Overhead Setup > Restore Defaults

Overhead Monitor

Function – Selecting Receiver Overhead Monitor	Path
Using Receiver Overhead Monitor	<Menu>, Overhead Monitor
Using Rx Overhead Monitor Trace Messages	<Menu>, Overhead Monitor > Trace Messages
Using Rx Overhead Labels (Signal Labels, Sync Status)	<Menu>, Overhead Monitor > Labels
Using Rx Overhead APS Messages	<Menu>, Overhead Monitor > APS Messages
Using Rx Overhead Bytes	<Menu>, Overhead Monitor > Byte Setup

Results

Function – Results and Measurement Timing	Path
View Trouble Scan Result	<Menu>, Results > Trouble Scan
Select Measurement Timing	<Menu>, Results > Measurement Timing
View Alarm Seconds Result	<Menu>, Results > Alarm Seconds
View Selected Measurement Error Summary Result	<Menu>, Results > Error Summary
View Measurement Errors Result	<Menu>, Results > Errors
Measure Performance Analysis	<Menu>, Results > Performance Analysis
Measure AU/SPE Pointer activity	<Menu>, Results > Network Measurement
Measure Frequency	<Menu>, Results > Signal Quality > Frequency
Measure Optical Power	<Menu>, Results > Signal Quality > Optical Power
View graph of Pointer movement	<Menu>, Graph > Pointer Graph

System Functions

Function – Remote Control, Date/Time, Preferences and Calibration	Path
View System Options and Software Revision	<Menu>, System > Options
Select Network Standard (SDH or SONET)	<Menu>, System > Preferences
MS-REI/REI-L result monitor selection	<Menu>, System > Preferences
MS-AIS/AIS-L alarm monitor selection	<Menu>, System > Preferences
G.826 collect ES, SES, BBE enable	<Menu>, System > Preferences
Enhanced RDI enable	<Menu>, System > Preferences
Beep on Error audio control	<Menu>, System > Preferences
Save System Preferences settings as default	<Menu>, System > Preferences
Set up remote operation via RS 232, GPIB or Lan	<Menu>, System > Remote Control
Setting Time and Date	<Menu>, System > Time and Date
Calibrate instrument	<Menu>, System > Calibration

System Functions – Measurement Logging

Function – Measurement Logging	Path
Set up Logging conditions (when, and results selection)	<Menu>, System > Measurement Logging, Enable Logging
Log results to File or Printer	<Menu>, System > Measurement Logging, Destination
Print Logged Results	<Menu>, System > Measurement Logging, Destination (Printer)
Set up Logging Interval Report	<Menu>, System > Measurement Logging, Interval Report
Log Errored Seconds	<Menu>, System > Measurement Logging, Errored Seconds
Select Logged Reports	<Menu>, System > Measurement Logging, Logged Reports
Log Alarmed Seconds	<Menu>, System > Measurement Logging, Alarmed Seconds

System Functions – File Manager

Function – File Manager	Path
Copy logging files to floppy disk drive (A:), or delete	<Menu>, System > File Manager, Logging, Drive (Internal)
Copy to or get Screen Dumps from floppy disk drive (A:)	<Menu>, System > File Manager, Screen Dumps
Copy to or get Stored Settings from floppy disk drive (A:)	<Menu>, System > File Manager, Stored Settings
Copy to or get your own User Help files from floppy disk.	<Menu>, System > File Manager, User Help

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In this book

This book is a quick reminder of how to use the Transmission Test Sets. It is aimed at both new and experienced users.

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